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## **Chapter 15**

# **Comprehensive review of the effect of using music in second language learning**

## **1 Introduction**

The present chapter reviews the application of music to teaching and learning a second language (L2). Conversations about the potential effect of music on brain function have widely circulated among the general public since Rauscher, Robinson, and Jens' (1998) study examining the impact of Mozart's music on listeners' spatial reasoning, finding that those who listened to ten minutes of a piece for two pianos performed better on a shape-predicting task than in situations where they listened to a relaxation tape or worked in silence. Although their study had a small number of participants ( $n=36$ ), and the music's positive effect on participants' spatial reasoning lasted only 10–15 minutes after the treatment, an oversimplification of the experiment results led people to believe that classical works by Bach or Mozart could help listeners enhance their memory and boost brain functions in the areas of mathematical analysis, analytical reasoning, or spatial reasoning.

Language teachers also share anecdotes in which they play classical music to relax their learners or use target cultures' folk songs, lullabies, or children's songs to teach L2 vocabulary, grammar, or pronunciation. Their positive perception of using music in L2 classrooms was well documented in Medina (2002). L2 teachers believed that repetition in song lyrics helps L2 learning by increasing learners' memory and that song lyrics could provide authentic input to learners (Medina 2002). Surveys also showed that learners also generally appreciate music in language classrooms (Chou 2014; Dolean 2016). Chou (2014) and Dolean (2016) reported survey results showing that learners felt that music provided them with an enjoyable L2 learning experience, principally because of a reduction in learners' anxiety.

A small number of empirical research studies have examined the effect of music on L2 learning and reported the characteristics of music as a treatment or

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an instructional tool in detail (Lee and Schreibeis 2012). The dearth of information on which L2 teachers can confidently rely leads them to anecdotal or indiscriminate selection of music (Lems 2005; Lee and Schreibeis 2012). This chapter aims to provide informative pedagogical suggestions by critically reviewing intervention studies that incorporate music in L2 learning. The first section of the chapter provides background information on the relationship between music and language teaching by reviewing (1) the commonalities between language and music, and (2) pedagogical reasons to include music in language education in relation to learners' affects (e.g., motivation, anxiety). The second section provides an overview of intervention studies using music in language teaching and reviews the validity of the studies with a focus on characteristics of music as a treatment. The chapter concludes with suggestions for increased collaboration among language teachers, language acquisition researchers, music researchers, and composers to develop language teaching materials that reflect a more comprehensive understanding about the relationship between language and music.

## 2 Background information

### 2.1 Commonalities between language and music

Language and music have several commonalities, including perceptive and cognitive attributes. Describing the similarities between language and music, Patel (2008) argued that music and oral language share representation mechanisms, including phonological, prosodic, lexical, semantic, syntactic, rhythmic, melodic, and harmonic features. Chobert and Besson (2013) also explained that pitch and duration, two distinct features of sound production, dictate the melodic and rhythmic features of both language and music. Heffner and Slevco (2015) considered pitch constraints in music and vowel harmony in language to be examples of prosodic constraints found in both domains. For example, they suggested that the seven-note pitch collection of the G major scale (G, A, B, C, D, E, and F-sharp) are compatible to Turkish vowel harmony in relation to lip rounding and tongue position (Heffner and Slevco 2015: para. 23). Patel (2008) argued that the relationship between oral language and music is also reflected in regional variation of note lengths in music and syllable lengths in language.

Syntactically, as Asano and Boeckx (2015) pointed out, there are hierarchical structures in language and music. While music is frequently structured

through temporal features (e.g., form, phrase, meter, and rhythm) and pitch features, including harmonic structures, oral language is similarly structured with phonemes, stress, and intonations. In addition, both music and language share rising and falling pitches, which can be conceived of through melodic contour in music and lexical tones in language (Arbib 2013).

Cognitive scientists – brain researchers, in particular – often focus on the location of language and music processing in the brain. That is, music is processed in Broca's area and the right-hemisphere homologue, the same locations where syntactic analysis happens when comprehending oral language (Patel 2008). This may suggest that humans perceive linguistic and musical data in a similar manner. Schön et al. (2008) provided empirical evidence that the brain processes musical and linguistic input in the same areas. They compared language learning based on speech sequences to language learning in relation to sung sequences. Manipulating musical properties (e.g., pitch and contour), their study provided convincing evidence for the connections between language and music processing. Through their findings, they argued sung melodic structures are helpful when people segment new words, especially in the early stages of learning a language.

Another interesting research area in language-music studies in cognitive science concerns the role of music in information recall (e.g., de Groot 2006; Purnell-Webb and Speelman 2008; Salcedo 2010). de Groot (2006) investigated the impact of background music on participants' ability to recall foreign language vocabulary. While his control group learned target vocabulary in silence, his treatment group learned the same vocabulary while an excerpt of Bach's Brandenburg Concerto No. 4 was played. Engaging in six treatment sessions and four vocabulary tests, the participants in the experimental group outperformed the control group. His study revealed that background music may have a positive impact on learners' ability to recall foreign language vocabulary. He also reported that while the positive effect of background music was small in the first test, it gradually increased, and that the effect was greater for infrequent words than frequent words. The findings were also confirmed in later studies using songs. For instance, Salcedo (2010) examined the effect of songs on recalling texts in a Spanish classroom in an American college. She divided participants into three groups: a music treatment group that listened to the songs; a text-treatment group that listened to the lyrics of the songs read by a native speaker of Spanish; and a control group. Her findings showed that the music treatment group outperformed both the text-treatment and control groups when recalling texts in the immediate post-test and the delayed post-test.

## 2.2 Affect, music, and language learning

Some of the arguments for introducing music in L2 teaching have focused on learners' affective states, including motivation and anxiety. In particular, recent interest in music in L2 teaching contexts is closely related to the expansion of research on motivation. Studies have shown that motivation is multifaceted and may potentially have many subconstructs. Motivation may also impact the relative ease of learning L2, as well as the amount of effort learners make in learning a new language (Arnold and Herrick 2017; Chou 2014; King 2010; Lee and Shin 2019). Those who support the use of music in L2 classrooms argue that song, in particular, can be a vehicle to motivate learners by providing authentic input and introducing target culture (Abbott 2002; Richards 1969; Shin 2017). Furthermore, presenting a theory of multiple intelligences, which attempted to explain learners' internal factors related to motivation, Gardner (2011) suggested that musical intelligence is one of eight intelligences, which also include spatial, logical-mathematical, linguistic, kinesthetic, interpersonal, intrapersonal, and naturalist. He also argued that everyone possesses all eight intelligence at varying degrees and suggests that teachers should be encouraged to develop lessons that can accommodate learners' multiple intelligences. He also maintained that musical intelligence develops during the same period in early life as linguistic intelligence.

Along with enhancing learners' motivation, the concerns of learners' anxiety in L2 classrooms also direct language teachers' and researchers' attention to introducing music in L2 classrooms. In the 1980s, Suggestopedia advocates supported using background music to create a conducive environment for language learning. For instance, Lozanov and Gateva (1988) suggested that when the target learning material was read aloud, teachers could play a selection of works they considered an "active concert", such as Beethoven's Violin Concerto or Haydn's Symphony No. 67 in F Major. Conversely, playing works like Handel's *Water Music* and Bach's Fantasy in G major, which they termed a "passive concert", could help learners transfer learned information to long-term memory; they believed this would lower learners' psychological barriers and promoted unconscious learning (Engh 2013). Similar discussions are also found in Krashen's affective filter hypothesis (Krashen 1985), where Krashen argued that it is critical to lower learners' affective filter for them to fully engage in language learning. Several studies were conducted to examine whether music could play a role in lowering the affective filter (Schön et al. 2008; Dolean 2016). Dolean (2016) examined the influence of using songs to teach French to 8<sup>th</sup> graders. He reported that his participants enjoyed learning through songs, and that his participants reported that they felt less anxious when learning French using music.

### 3 Intervention studies

While the previously discussed studies suggest a positive effect in using music to teach L2, not all of them employed an intervention approach to systematically collect evidence in support of their claims. Therefore, the authors decided to review only the empirical studies that used music as a treatment. Using databases that included ERIC, PsycINFO, and LLBA, limiting the publication date from 2001 to 2019, and including only those studies appearing in peer-reviewed journals, the authors identified a good number of publications showing the positive effect of music on L2 learning. However, the majority of these studies lacked empirical evidence. Instead, they argued generally for the use of music in language classrooms, provided resources, or described activities for using music as teaching methods (e.g., Abbott 2002). While these works could certainly prove helpful for language teachers, the goal of this chapter is to evaluate reliable evidence to support or reject the claims that music facilitates language learning. Hence, the authors reviewed only intervention studies that employed quasi-experimental or experimental designs, incorporated pre- and post-tests to investigate the gain in learners' linguistic abilities, and described the music that they employed as a treatment. Out of 34 studies, 10 met these criteria. A summary of the studies the authors reviewed is provided in the appendix.

The 10 intervention studies retained for analysis in the current study adopted a general design of pre-test, treatment(s), and post-test. Some studies include a delayed-post-test to measure the long-term effect of treatments or control groups. A control group is a group of participants who participate in the study in the exact same ways as experimental groups except for the treatment; they take both pre- and post-tests and, ideally, spend similar time receiving input but not the treatment (Mackey and Gass 2005). Research designs that include control groups may provide more reliable evidence and support stronger arguments than experiments that rely solely on a post-test to assess treatment. However, not all of the selected studies employed control groups.

#### 3.1 Participants

The age ranges of participants in the selected research studies vary. Some of the participants were as young as four years old; other studies observed learners at middle schools or adult learners. Regardless of participants' ages, the studies show music making a generally positive impact in participants' post-test performance.

The number of participants in the reviewed studies was relatively small for a conventional intervention design. The largest number of participants was 64 in Davis and Fan (2016). They provided 15 lessons, each 40 minutes long, using English songs to teach English vocabulary to 64 kindergarten children in China. The participants were not divided into treatment or control groups; instead, they selected control or experimental vocabulary items. Depending on the sequence of treatments, each group of participants received different experimental vocabulary items. The second largest number of participants was 63, in Fonseca-Mora, Jara-Jiménez, and Gómez-Domínguez (2015); they were divided into two treatment groups (i.e., musical and non-musical treatment) and a control group. The number of participants who received phonological awareness instruction through music was 18. This number of participants is typical for most of the intervention studies the authors reviewed for the chapter.

### 3.2 Analysis methods

Descriptive statistics and the percentage calculation of gains from pre-tests to post-tests were frequently used in the selected studies. These analytic methods help readers understand general trends of the treatment impact; however, rigorous statistical analyses, including parametric analyses and inferential statistics (e.g., ANOVA, MANOVA, regression analysis), would strengthen the studies' arguments. Finally, unless a study is a true experimental study, with a control group, it is a challenge to make a causality conclusion or strong claims that the experimental groups' better performance directly relates to the incorporation of music.

When using inferential statistics, the reviewed studies often used non-parametric analysis. It is assumed that due to the small number of participants and the fact that the studies did not employ random assignments of participants, the researchers employed non-parametric analysis. For instance, Coyle and Gomez Gracia (2014) and Fonseca-Mora et al. (2015) use non-parametric analyses including Friedman tests and Wilcoxon signed-rank tests. When the studies used parametric analyses including *t*-tests or analysis of variance (ANOVA), only a couple of studies reported normality reports before reporting mean differences analyses. In particular, Ludke and her colleagues (2014) implemented an experimental design and randomly assigned the participants into three treatment groups: speaking, rhythmic speaking, or singing conditions. Investigating the respective effect of the three conditions on L2 phrase learning, they provided a 15-minute Hungarian lesson to 60 adult speakers of English. In the pre- and post-tests, the participants were asked to recall and produce

learned Hungarian expressions. They reported the test of homogeneity before they compared the means among the participant groups. Based on the positive homogeneity test results, they conducted both ANOVA and multivariate analysis of variance (MANOVA). Their results showed that the singing group outperformed the other two groups. Their research findings are convincing, as they adopted an experimental design with random assignment as well as relatively rigorous statistical analyses.

Employing an experimental design or a quasi-experimental design is critical to increasing the trustworthiness of the research findings. An experimental design will help researchers safely rule out potentially interfering individual factors. Among the individual factors that can impact the results of the studies are learners' personality and musical aptitude. For instance, Furnham and Allass (1999) reported that extroverts performed better with treatments using music than introverts did. Musical aptitude is another factor that plays an important role in determining the effect of music in language learning. For example, research generally shows that those who have higher musical aptitude perform better in learning L2 pronunciation (Milovanov et al. 2008; Li and Dekeyser 2017). A true experimental design may rule out any unexpected effects of individual factors; however, none of the studies reviewed fell into that category.

### 3.3 Characteristics of music in the studies

The intervention studies the authors reviewed used vocal music rather than instrumental music as their treatments. In some studies, participants sang songs (e.g., Legg 2009; Coyle and Gomez Gracia 2014; Ludke et al. 2014; Good, Russo, and Sullivan 2015; Alissari and Heikkola 2016; Davis and Fan 2016; Ludke 2018), while in others, participants listened to the songs (e.g., de Groot and Smedinga 2014; Moradi and Shahrokhi 2014; Fonseca-Mora et al. 2015). Believing that songs helped learners understand culture as well as practice language, researchers of the reviewed studies focused on nursery rhymes and folk songs. Nursery rhymes were often used, as they have a high degree of repetition in lyrics, and folk songs were used because they convey significant cultural knowledge. They believed that these song types could provide cultural understanding for those who did not grow up in the target language culture as well as opportunities for practicing pronunciation.

Coyle and Gomez Gracia (2014) used children's songs to teach English vocabulary to preschool children in Spain. They measured the participants' receptive and productive vocabulary knowledge prior to and after three 30-minute



lessons using songs. In the lesson, participants sang the song *The wheels on the bus*, in which the target vocabulary of instruction is included in the lyrics. The song's lyrics emphasize vocabulary repetition including "round", "beep", "open", "shut", and "ding". For example, the second stanza of the song goes:

The horn on the bus goes  
 "Beep, beep, beep  
 Beep, beep, beep  
 Beep, beep, beep"  
 The horn on the bus goes  
 "Beep, beep, beep"  
 All through the town.

Musically, the work is in a moderate tempo simple quadruple meter (4/4) and consists of a single 8-bar phrase, which is repeated for each stanza. The major key melody is mostly built on triads that outline tonic and dominant harmonies. Many arrangements of the song exist, and while Coyle and Gomez Gracia did not specify the version they used, they reported statistically significant gains in receptive vocabulary knowledge. The participants' productive vocabulary knowledge, however, did not improve much.

Good, Russo, and Sullivan (2015) also used a song, *Functions of the face* by The Short and Curlies (2009), to investigate the impact of singing songs on pronunciation, text recall, and translation of L2. Randomly assigning Spanish-speaking children into a group that sang the song and a group that read the lyrics, Good and colleagues taught "Functions of face" for 20 minutes, four times over two weeks. The contemporary rock style of this children's song includes guitars and drums. With an upbeat tempo in simple quadruple meter (4/4), the major mode melody is mostly stepwise. The lyrics pose questions that orient the listener to the parts of the face:

Why does a table look like a table?  
 And why do my daddy's feet smell gross?  
 Why does lasagna taste so delicious?  
 And why can I hear the piano playing notes?

In the post-tests on English pronunciation, lyric recall, and lyric translation, those who received lessons by singing songs outperformed the group who read lyrics.

While most previous studies used preexisting songs, two studies used songs that were newly composed to teach specific target linguistic features. Teaching vocabulary and improving the ability to recall texts, Legg (2009) composed a song in a blues style, which he felt was suitable due to its relative

simplicity and accessibility. Using the song, he taught French vocabulary to middle school students. The experimental group outperformed the control group in translating French sentences. However, as the author acknowledged, more rigorous research methodology should be used to confirm the effect of music. In particular, because the pre- and post-tests were not standardized or validated, it is not straightforward to confirm his results.

Ludke et al. (2014) composed a series of target phrases in Hungarian, in which the rhythm and melodic contour reflect the natural prosody of the text within a pitch framework consistent with patterns found in Hungarian folk songs. Rather than categorize this as a song, it is simply a sung setting of specific foreign language phrases. This presents an interesting and easy-to-adapt model for other vocabulary or longer phrases.

Compared to the studies by Moradi and Shahrokhi (2014) and Fonseca-Mora et al. (2015), where the participants actively listened to music to learn target language used in the songs, de Groot and Smedinga (2014) examined the influence of passive exposure to background music on learning L2 vocabulary. Specifically, they played pop songs in a language with which the participants had no prior exposure (i.e., Greek) and pop songs in languages with which the participants were familiar (Dutch and English).

As the songs played in the background, participants were shown target vocabulary items on the computer screen with their L1 translation and learned vocabulary. One group worked while pop songs in Greek played, another in Dutch, and a third group in English. Everyone worked in silence before they were grouped into three different conditions. They found that those who learned vocabulary while pop songs in a familiar language played in the background performed poorly on vocabulary recall tests compared to those who learned with background pop songs in an unfamiliar language or when they learned in silence. However, all groups performed similarly in a delayed vocabulary post-test given one week later, suggesting the adverse effect of background music in a familiar language was temporary.

Although published in the Video and Media Interest section of the *TESOL Newsletter*, it is worth mentioning Lee and Schreibeis (2012) for its methodology. We conducted an experimental study using songs and lyrics composed especially for the study in order to test the effect of specific melodic types as tools for learning synforms, which are vocabulary items with the same roots but different affixes (e.g., tasteful, tasty; sensitive, sensible; credible, credulous). Participants were divided into four groups, the first three of which received musical instruction, and a fourth group that did not. Among the musical groups, all three used identical lyrics with the same rhythm, through which the target vocabulary was delivered; no separate instruction was given. The first two

groups sang songs with identical chord progressions but different melodies: while the first group gradually ascended an octave, outlining a major scale (Figure 15.1), the second group's range was restricted to the first three notes of the major scale (Figure 15.2). The third group spoke the lyrics rhythmically with a repeated drum pattern as accompaniment. Prior to and after the treatments, the participants took tests on noticing the target vocabulary (i.e., circle words that were recognized), comprehending the target vocabulary (i.e., select the meaning of target vocabulary from multiple choices), and producing the target vocabulary (i.e., fill in the blanks).

Voice

Matthew Schreibeis

Song #3a

Matthew Schreibeis

**Moderato** ♩ = 76

In your dreams ma-ny things are just i-ma-gi-na-ry. When you're young all your thoughts are so i-ma-gi-na-tive. As you grow your be-liefs be-come in-tel-li-gi-ble. When you're old you can be an in-tel-lec-tu-al.

Figure 15.1: Experimental group 1.

The post-test showed that those who received instruction with the first musical selection, which exhibited ascending melodic structure, outperformed the other three groups. Because all other musical factors were controlled, this experiment represents a more convincing example of the efficacy of a particular musical structure, that is, ascending melodic structure, for teaching vocabulary through music.

## Voice

Matthew Schreibeis

## Song #3b

Matthew Schreibeis

**Moderato** ♩ = 76

In your dreams ma - ny things are just i - ma - gi - na -

ry. When you're young all your thoughts are so i - ma - gi - na - tive. As you

grow your be - liefs be - come in - tel - li - gi - ble. When you're

old you can be an in - tel - lec - tu - al.

Figure 15.2: Experimental group 2.

## 4 Implications and future directions

Research has suggested that language and music share several perceptive and cognitive commonalities. Even with the limited information available, it is possible to argue that music has great potential as a valuable subject for cognitive, emotional, and language development. Music can be used to teach unfamiliar vocabulary, pronunciation, or prosody in both first and second language. While the studies discussed present a clear positive potential for using music as part of L2 teaching, we need to be cautious about their future applications due to a number of underlying issues. The most fundamental of these is a lack of specificity about music that is used. While there is no doubt merit in the idea of using music generally as part L2 teaching, the lack of specificity about the chosen repertoire belies the complexity of identifying useful musical selections for teaching among the infinite music available to educators. The scope of this repertoire is staggering and includes folk, sacred, classical, and popular styles, among others, from every corner of the globe. Adding to the complexity is the fact that even if considering a well-known traditional or popular song, for example, there may be numerous arrangements with varied accompaniments or even in differing styles. The enormous range of repertoire raises issues about the complexity of the music used; the level of performance difficulty if the selection is, for example, a song to be sung; the musical background of the

participants; and the familiarity of a given musical style or particular selection to a group of learners. This familiarity could be based on individual experience, cultural familiarity, or both, and may be especially relevant in more culturally diverse teaching environments.

It is important to remember that the function of including music in L2 is to enhance learning and not, for example, as part of a singing lesson. Because of this, instructors must be able to practically incorporate whatever music they choose. The music itself, regardless of style, must be sophisticated enough for learners to engage with, whether through singing, listening, or some other activity, but not so complex, difficult to produce or perform, or unfamiliar as to distract or in any other way negatively impact the learning experience. Further, the musical selection must be geared toward specific task(s), e.g., pronunciation, vocabulary, or cultural awareness. This is a distinct goal from simply having an enjoyable experience by singing or listening to music in class or from promoting a generally positive or relaxing classroom environment.

The music used in the reviewed studies has many features that language teachers could manipulate and use for their own instructional purposes; however, without even basic musical training, the task would be a challenge. Therefore, we recommend that teacher education courses include basic information about music to help language teachers make more informed decisions when choosing musical selections. We further suggest collaboration among language researchers, music researchers, and composers in developing language teaching materials that build off existing and future research findings.

Further research must be done to isolate specific musical parameters along the lines of Lee and Schreibeis (2012). This could include additional studies on the effects of specific melodic patterns, as well as harmonic, rhythmic, timbral and other musical parameters. The goal of these studies would be to determine which precise musical structures can be used to highlight particular linguistic features. Ultimately, this work must lead to the creation of lesson-specific teaching materials that incorporate music specifically composed for a particular task or target linguistic feature. This could include individual exercises, which, ideally, could be flexible enough to apply to multiple situations or vocabulary items or an entire L2 method using music as a key component. The key to future use of music as an effective component of L2 learning, regardless of how it is used, lies in those with expertise in language and music working together to achieve the same teaching and curricular goals.

## Note

The first author of the chapter is an applied linguist and teacher educator, and the second author is a music composer and music educator. The chapter was a product of the two authors' collaboration across two disciplines. Over the course of writing this chapter together, the two authors developed a further understanding of each other's fields, which will provide an opportunity for future collaboration of a more rigorous and informed nature on music and L2 learning.

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## Appendix Intervention research studies

Study	N of participants	Participants' age	Target forms/features	Characteristics of music as a treatment
Alissari & Heikkola 2016	51 (Experimental n = 11)	18–33	Writing fluency in Finnish	11 Finnish children's songs and 7 pop songs
Coyle & Garcia 2014	25	5 years old	English vocabulary	Three 30-minute song lessons The wheels on the bus – repetition
Davis & Fan 2016	64	4–5 years old	English vocabulary	All songs consisted of new texts set to familiar melodies including <i>Twinkle Twinkle Little Star</i> and <i>The More We Get Together</i> , or very simple and repetitive melodies.



(continued)

Study	N of participants	Participants' age	Target forms/features	Characteristics of music as a treatment
de Groot & Smedinga 2014	41	College students	English vocabulary	Pop songs by Tamta (2006), tracks 2, 6, 8, 10, and 11; Pausini (2002), track 1; Marlin (1999) tracks 3 and 8; Marlin (2003) tracks 1 and 3
Fonseca-Mora et al 2015	63 (Experimental n = 18)	7–8 years old	English vocabulary	Songs with lyrics The musical experimental group was taught through video-clips that included musical elements such as songs with lyrics.
Good et al 2015	38 (Experimental n = 16)	9–13 years old	English pronunciation, lyric recall, comprehension	Functions of the face
Legg 2009	56 (Experimental n = 27)	Year 8	French vocabulary	Blues style, primary chords, quadruple time, diatonic, modest range in D minor
Ludke et al 2014	60 (Experimental n = 20)	18–29 years old	Hungarian vocabulary	Stimuli that modeled after Hungarian folk song
Ludke 2018	45 (Experimental n = 23)	12–13 years old	French Beginning vocabulary and pronunciation, sentence structures	Songs with target vocabulary and chanting, rap songs, students' musical composition using target vocabulary, pronunciation, and grammatical structures.
Moradi & Shahrokhi 2014	30 (Experimental group n = 15)	9–12 years old	English pronunciation	Listening to 7 songs for 20 minutes each time during 25 lessons